Positron emission tomography for quality assurance in proton therapy

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DOI:
10.33612/diss.110452833

Stellingen behorend bij het proefschrift

Positron Emission Tomography for Quality Assurance in Proton Therapy

1. Using ^{12}N PET imaging, accurate feedback on the dose delivery can be obtained in real-time.

2. Good quality PET data can be obtained during beam delivery by removing prompt counts using an anti-coincidence filter with the delivered proton bunches.

3. A large dual panel PET scanner that images a single spot at the beginning of the dose delivery, can measure a 5 mm range shift with millimeter accuracy using ^{12}N imaging.

4. Optimization of in vivo dose delivery verification requires detailed investigations of a variety of clinical cases; irradiation of simple phantoms does not capture the full complexity of the problem.

5. An advantage of PET over prompt gamma ray imaging is the fact that the basic technology is not developed solely for range verification.

6. The need for accurate range verification is increased by developments in hadron therapy such as hypofractionation or the use of high instantaneous beam intensities.

7. Fast PET measurements of the *in-vivo* proton range will provide comfort in the delivery of more bold treatment plans with reduced margins, which will result in clinical benefits.

8. Technological artifacts can mean different things to different people and are shaped by relevant social groups.
   (Pinch and Bijker, 1984)

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10 januari 2020